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R. Mahoney



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|----|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|
| 1. | Your reference | C4308 (C)/RJG |
| 2. | Patent application number
<i>(The Patent Office will fill in this part)</i> | 0314211.4 |
| 3. | Full name, address and postcode of the or of each applicant <i>(underline all surnames)</i> | UNILEVER PLC
UNILEVER HOUSE, BLACKFRIARS
LONDON, EC4P 4BQ |
| | Patents ADP number <i>(if you know it)</i> | 50426956002 |
| | If the applicant is a corporate body, give the country/state of its incorporation | UNITED KINGDOM |
| 4. | Title of the invention | LAUNDRY TREATMENT COMPOSITIONS |
| 5. | Name of your agent <i>(if you have one)</i> | ELLIOTT, Peter William |
| | "Address for Service" in the United Kingdom to which all correspondence should be sent <i>(including the postcode)</i> | PATENT DEPARTMENT, UNILEVER PLC
COLWORTH HOUSE, SHARNBROOK
BEDFORD, MK44 1LQ |
| | Patents ADP number <i>(if you know it)</i> | 6573927 001 |
| 6. | If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and <i>(if you know it)</i> the or each application number | Country Priority application number
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1 ✓

Request for substantive examination
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I/We request the grant of a patent on the basis of this application.

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Sandra Jane EDWARDS, Authorised Signatory

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- 1 -

LAUNDRY TREATMENT COMPOSITIONS

TECHNICAL FIELD

- 5 The present invention relates to laundry treatment compositions which comprises a dye which are substantive to cotton but do not build-up over multiple washes.

BACKGROUND AND PRIOR ART

10

Dyes have been included in laundry treatment products for many years. Perhaps the oldest use of dyes is to add a substantive coloured dye to coloured clothes which require rejuvenation of colour for example a substantive blue dye 15 for rejuvenation of denim. These compositions usually contain a relatively high concentration of substantive dye. More recently non-substantive dyes have also been used to colour otherwise white laundry detergent compositions. In the case of particulate detergents this has been in the form 20 of so-called speckles to add colour to an otherwise white powder, however laundry detergent powders which are completely blue are also known. When dyes have been included in laundry treatment products in this way it was regarded as essential that non-substantive dyes were used to 25 prevent undesired staining of washed fabrics.

It is also known that a small amount of blue or violet dye impregnated into an otherwise 'white' fabric can appear to have enhanced whiteness as described in Industrial Dyes 30 (K.Hunger ed Wiley-VCH 2003). Modern white fabrics are sold with some dye in their material in order to enhance the

whiteness at the point of sale of the garment. This dye is often blue or violet though other colours are used. However once these garments are worn and subsequently washed with a detergent composition the dye is rapidly removed from the fabric due to dissolution by the surfactant solution. Dye is also lost by reaction with bleach in the wash and fading due to light. This results in a gradual loss of whiteness in addition to any other negative effects such as soiling. In many cases this leads to the appearance of a yellow colour on the cloth.

The present inventors have surprisingly found that if certain substantive dyes are applied to fabrics during an aqueous treatment process then the concentration of dye in the fibres of the fabric does not continuously increase after each treatment process but instead approaches a constant value.

Accordingly, the present invention provides a laundry treatment composition which comprises a dye which is substantive to cotton, wherein during multiple treatments applied to a substantially white cotton fabric initially free of the dye, the treatments comprising applying the treatment composition to the cotton fabric in an aqueous environment and the fabric being subsequently dried, the loading of dye on the fabric does not increase in proportion to the number of washes.

DETAILED DESCRIPTION OF INVENTION

Unless otherwise stated, all percentages or parts are on a weight basis.

5

Laundry treatment compositions

The present invention relates to compositions which are used to treat laundry items such as clothes. Such compositions 10 are preferably laundry detergent compositions used for washing (especially particulate detergents, liquid detergents, laundry bars, pastes, gels or tablets), laundry fabric conditioners used for softening fabrics, pre-treatment products, post-treatment products, tumble dryer 15 products, ironing products etc. Preferably they are laundry treatment products which are applied in an aqueous environment.

The dyes may be incorporated into the treatment products in 20 a wide variety of ways. For example dyes which are not sensitive to heat may be included in the slurry which is to be spray dried when the treatment product is a particulate detergent composition. Another way of incorporating dyes into particulate detergent products is to add them to 25 granules which are post-added to the main detergent powder. In this case there may be a concentration of dye in the granules which could present the danger of spotting and dye damage on the clothes to be treated. This can be avoided if the concentration of dye in the granules is less than 0.1%. 30 For liquid products the dyes are simply added to the liquid and blended in substantially homogeneously.

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Because the dyes are substantive, only a small amount is required to provide the enhanced whiteness effect hence preferably the treatment composition comprises from 0.0001 to 0.1 wt%, preferably from 0.0005 to 0.05 wt% of the dye,
5 more preferably from 0.001 to 0.01 wt%, most preferably from 0.002 to 0.008 wt%.

The dyes

10 The dyes of the present invention are unusual in that they are substantive to cotton. The treatment compositions of the present invention comprises a dye which is substantive to cotton, wherein during multiple treatments applied to a substantially white cotton fabric initially free of the dye,
15 the treatments comprising applying the treatment composition to the cotton fabric in an aqueous environment and the fabric being subsequently dried, the loading of dye on the fabric does not increase in proportion to the number of washes.

20

Preferably the dyes are substantive to a degree such that after 10 treatments, preferably after 5 treatments, applied to a substantially white cotton fabric initially free of the dye, the concentration of the dye in the fabric approaches a
25 substantially constant value.

It is preferred that the dye has a substantivity to cotton in a standard test of greater than 7%, preferably from 8 to 80%, more preferably from 10 to 60%, most preferably from 15
30 to 40%, wherein the standard test is with a dye loading such that the solution has an optical density of approximately 1

(5 cm pathlength) at the maximum absorption of the dye in the visible wavelengths (400-700nm), a surfactant concentration of 0.3 g/L and under wash conditions of a liquor to cloth ratio of 45:1, temperature of 20°C, soak 5 times of 45 minutes, agitation time of 10 minutes.

In addition to being substantive, the dyes of the present invention do not show any significant build-up over repeated treatment/wear cycles. In this way a substantially constant amount of dye can be maintained on the clothes even though they are being treated (e.g. washed) and subsequently worn, even over very many such cycles. Many substantive dyes do not show this property and merely build-up on the fabric, increasing their loading in an almost linear manner with each treatment. Eventually these dyes will have the effect of making whites appear coloured and pastel shades will lose their subtle shade. Hence it is essential that the dyes of the present invention do not show this behaviour.

10 Preferably, the ratio of the dye loading on white cotton after 5 washes to the dye loading after 1 wash is less than 4, preferably less than 3, more preferably less than 2, most preferably less than 1.5.

15 20 Hence the dyes according to the present invention can be said to have an intermediate degree of substantivity, in that during aqueous treatment of the fabrics some of the dye is lost from the fabric to the aqueous solution and some of the dye is deposited onto the fabric.

The dyes of the present invention are photostable. A photostable dye is a dye which does not quickly photodegrade in the presence of natural summer sunlight. A photostable dye in the current context may be defined as a dye which,

5 when on cotton, does not degrade by more than 10% when subjected to 1 hour of irradiation by simulated Florida sunlight (42 W/m^2 in UV and 343 W/m^2 in visible).

It is preferable that the dyes have a blue and/or violet shade. This can mean that the peak absorption frequency of the dye absorbed on the cloth lies within the range of from 540nm to 650nm, preferably from 570nm to 630nm. It is also possible that the same effect can be achieved by a combination of dyes, each of which not necessarily having a peak absorption within these preferred ranges but together produce an effect on the human eye which is equivalent to a single dye with a peak absorption within one of the preferred ranges.

20 Organic dyes are described in Industrial Dyes (K.Hunger ed Wiley-VCH 2003). A compilation of available dyes is the Colour Index published by Society of Dyer and Colourists and American Association of Textile Chemists and Colorists 2002 (see <http://www.colour-index.org>). Suitable dyes for the 25 current application may be taken from any of the chromophore types, e.g. azo, anthraquinone, triarylmethane, methine quinophthalone, azine, oxazine thiazine. It is preferred-- that the dye does not contain a reactive group such as found in procion and remazol dyes. Due to the wider range 30 available azo, anthraquinone and triarylmethane dyes are preferred. Azo dyes are especially preferred.

Dyes are conventionally defined as being reactive, disperse, direct, vat, sulphur, cationic, acid or solvent dyes. For the purposes of the present invention, acid and/or direct dyes are preferred. Acid dyes are most preferred.

5

For use in products which contain predominately anionic surfactants, dyes containing acid groups are preferred. For use in products which contain predominantly cationic surfactants, dyes containing basic groups are preferred.

10 This is to prevent precipitation between the dye and surfactant.

Suitable dyes for use in products containing predominately anionic surfactants include those listed in the Colour Index 15 as Direct Violet Dyes (e.g. Direct Violet 1-108), Direct Blue dyes, Acid Blue and Acid Violet dyes.

Suitable dyes for use in products containing predominately cationic surfactants include those listed in the Colour 20 Index as Basic Blue and Basic Violet Dyes.

To avoid shade changes caused by pick or loss of a proton it is preferred that the dye does not have a pKa or pKb at or near the pH of the product. Most preferably no pKa or pKb 25 in the pH range of from 7 to 11.

It is preferred that the dye has a high extinction coefficient, so that a small amount of dye gives a large amount of colour. Preferably the extinction coefficient at 30 the maximum absorption of the dye is greater than 1000 mol^{-1}

L cm⁻¹, preferably greater than 10,000 mol⁻¹ L cm⁻¹, more preferably greater than 50,000 mol⁻¹ L cm⁻¹.

Suitable dyes can be obtained from any major supplier such
5 as Clariant, Ciba Speciality Chemicals, Dystar, A vecia or
Bayer.

Laundry detergent compositions

10 Detergent-active compounds (surfactants) may be chosen from soap and non-soap anionic, cationic, nonionic, amphoteric and zwitterionic detergent-active compounds, and mixtures thereof. Many suitable detergent-active compounds are available and are fully described in the literature, for
15 example, in "Surface-Active Agents and Detergents", Volumes I and II, by Schwartz, Perry and Berch. The preferred detergent-active compounds that can be used are soaps and synthetic non-soap anionic and nonionic compounds. The total amount of surfactant present is suitably within the
20 range of from 5 to 60 wt%, preferably from 5 to 40 wt%.

Anionic surfactants are well-known to those skilled in the art. Examples include alkylbenzene sulphonates, particularly linear alkylbenzene sulphonates having an alkyl chain length of C₈-C₁₅; primary and secondary
25 alkylsulphates, particularly C₈-C₂₀ primary alkyl sulphates; alkyl ether sulphates; olefin sulphonates; alkyl xylene sulphonates; dialkyl sulphosuccinates; and fatty acid ester sulphonates. Sodium salts are generally preferred.

Nonionic surfactants that may be used include the primary and secondary alcohol ethoxylates, especially the C₈-C₂₀ aliphatic alcohols ethoxylated with an average of from 1 to 20 moles of ethylene oxide per mole of alcohol, and more

- 5 especially the C₁₀-C₁₅ primary and secondary aliphatic alcohols ethoxylated with an average of from 1 to 10 moles of ethylene oxide per mole of alcohol. Non-ethoxylated nonionic surfactants include alkanolamides, alkylpolyglycosides, glycerol monoethers, and
- 10 polyhydroxyamides (glucamide).

Cationic surfactants that may be used include quaternary ammonium salts of the general formula R₁R₂R₃R₄N⁺ X⁻ wherein the R groups are long or short hydrocarbyl chains, typically alkyl, hydroxyalkyl or ethoxylated alkyl groups, and X is a solubilising anion (for example, compounds in which R₁ is a C₈-C₂₂ alkyl group, preferably a C₈-C₁₀ or C₁₂-C₁₄ alkyl group, R₂ is a methyl group, and R₃ and R₄, which may be the same or different, are methyl or hydroxyethyl groups); and

20 cationic esters (for example, choline esters).

Amphoteric and zwitterionic surfactants that may be used include alkyl amine oxides, betaines and sulphobetaines. In accordance with the present invention, the detergent

25 surfactant (a) most preferably comprises an anionic sulphonate or sulphonate surfactant optionally in admixture with one or more cosurfactants selected from ethoxylated nonionic surfactants, non-ethoxylated nonionic surfactants, ethoxylated sulphate anionic surfactants, cationic

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surfactants, amine oxides, alkanolamides and combinations thereof.

Surfactants are preferably present in a total amount of from
5 5 to 60 wt%, more preferably from 10 to 40 wt%.

Laundry detergent compositions of the present invention
preferably contain a detergency builder, although it is conceivable that formulations without any builder are
10 possible.

Laundry detergent compositions of the invention suitably contain from 10 to 80%, preferably from 15 to 70% by weight, of detergency builder. Preferably, the quantity of builder
15 is in the range of from 15 to 50% by weight.

Preferably the builder is selected from zeolite, sodium tripolyphosphate, sodium carbonate, sodium citrate, layered silicate, and combinations of these.

20 The zeolite used as a builder may be the commercially available zeolite A (zeolite 4A) now widely used in laundry detergent powders. Alternatively, the zeolite may be maximum aluminium zeolite P (zeolite MAP) as described and
25 claimed in EP 384 070B (Unilever), and commercially available as Doucil (Trade Mark) A24 from Ineos Silicas Ltd, UK.

Zeolite MAP is defined as an alkali metal aluminosilicate of
30 zeolite P type having a silicon to aluminium ratio not

exceeding 1.33, preferably within the range of from 0.90 to 1.33, preferably within the range of from 0.90 to 1.20.

Especially preferred is zeolite MAP having a silicon to aluminium ratio not exceeding 1.07, more preferably about

5 1.00. The particle size of the zeolite is not critical.

Zeolite A or zeolite MAP of any suitable particle size may be used.

Also preferred according to the present invention are

10 phosphate builders, especially sodium tripolyphosphate.

This may be used in combination with sodium orthophosphate, and/or sodium pyrophosphate.

Other inorganic builders that may be present additionally or

15 alternatively include sodium carbonate, layered silicate, amorphous aluminosilicates.

Organic builders that may be present include polycarboxylate polymers such as polyacrylates and acrylic/maleic

20 copolymers; polyaspartates; monomeric polycarboxylates such as citrates, gluconates, oxydisuccinates, glycerol mono-di- and trisuccinates, carboxymethyloxysuccinates, carboxy-methyloxymalonates, dipicolinates, hydroxyethyl-iminodiacetates, alkyl- and alkenylmalonates and succinates; 25 and sulphonated fatty acid salts.

Organic builders may be used in minor amounts as supplements to inorganic builders such as phosphates and zeolites.

Especially preferred supplementary organic builders are 30 citrates, suitably used in amounts of from 5 to 30 wt %, preferably from 10 to 25 wt %; and acrylic polymers, more

especially acrylic/maleic copolymers, suitably used in amounts of from 0.5 to 15 wt %, preferably from 1 to 10 wt %. Builders, both inorganic and organic, are preferably present in alkali metal salt, especially sodium salt, form.

5

As well as the surfactants and builders discussed above, the compositions may optionally contain bleaching components and other active ingredients to enhance performance and properties.

...10

These optional ingredients may include, but are not limited to, any one or more of the following: soap, peroxyacid and persalt bleaches, bleach activators, sequestrants, cellulose ethers and esters, other antiredeposition agents, sodium sulphate, sodium silicate, sodium chloride, calcium chloride, sodium bicarbonate, other inorganic salts, proteases, lipases, cellulases, amylases, other detergent enzymes, fluorescers, photobleaches, polyvinyl pyrrolidone, other dye transfer inhibiting polymers, foam controllers, foam boosters, acrylic and acrylic/maleic polymers, citric acid, soil release polymers, fabric conditioning compounds, coloured speckles, and perfume.

Detergent compositions according to the invention may 25 suitably contain a bleach system. The bleach system is preferably based on peroxy bleach compounds, for example, inorganic persalts or organic peroxyacids, capable of yielding hydrogen peroxide in aqueous solution. Suitable peroxy bleach compounds include organic peroxides such as 30 urea peroxide, and inorganic persalts such as the alkali metal perborates, percarbonates, perphosphates, persilicates

and persulphates. Preferred inorganic persalts are sodium perborate monohydrate and tetrahydrate, and sodium percarbonate. Especially preferred is sodium percarbonate having a protective coating against destabilisation by
5 moisture. Sodium percarbonate having a protective coating comprising sodium metaborate and sodium silicate is disclosed in GB 2 123 044B (Kao).

The peroxy bleach compound is suitably present in an amount
10 of from 5 to 35 wt%, preferably from 10 to 25 wt%.

The peroxy bleach compound may be used in conjunction with a bleach activator (bleach precursor) to improve bleaching action at low wash temperatures. The bleach precursor is
15 suitably present in an amount of from 1 to 8 wt%, preferably from 2 to 5 wt%.

Preferred bleach precursors are peroxycarboxylic acid precursors, more especially peracetic acid precursors and
20 peroxybenzoic acid precursors; and peroxycarbonic acid precursors. An especially preferred bleach precursor suitable for use in the present invention is N,N,N',N'-tetracetyl ethylenediamine (TAED). Also of interest are peroxybenzoic acid precursors, in particular, N,N,N-
25 trimethylammonium toluoyloxy benzene sulphonate.

A bleach stabiliser (heavy metal sequestrant) may also be present. Suitable bleach stabilisers include ethylenediamine tetraacetate (EDTA) and the polyphosphonates
30 such as Dequest (Trade Mark), EDTMP.

Although, as previously indicated, in one preferred embodiment of the invention enzymes are preferably absent, in other embodiments detergent enzymes may be present. Suitable enzymes include the proteases, amylases, cellulases, 5 oxidases, peroxidases and lipases usable for incorporation in detergent compositions.

In particulate detergent compositions, detergency enzymes are commonly employed in granular form in amounts of from about 10 0.1 to about 3.0%wt%. However, any suitable physical form of enzyme may be used in any effective amount.

Antiredeposition agents, for example cellulose esters and ethers, for example sodium carboxymethyl cellulose, may also 15 be present.

The compositions may also contain soil release polymers, for example sulphonated and unsulphonated PET/POET polymers, both end-capped and non-end-capped, and polyethylene 20 glycol/polyvinyl alcohol graft copolymers such as Sokolan (Trade Mark) HP22. Especially preferred soil release polymers are the sulphonated non-end-capped polyesters described and claimed in WO 95 32997A (Rhodia Chimie).

25 Powder detergent composition of low to moderate bulk density may be prepared by spray-drying a slurry, and optionally postdosing (dry-mixing) further ingredients.
"Concentrated" or "compact" powders may be prepared by mixing and granulating processes, for example, using a high-
30 speed mixer/granulator, or other non-tower processes.

- 15 -

Tablets may be prepared by compacting powders, especially "concentrated" powders.

Fabric conditioners

5

Cationic softening material is preferably a quaternary ammonium fabric softening material.

The quaternary ammonium fabric softening material compound
10 has two C₁₂-28 alkyl or alkenyl groups connected to the nitrogen head group, preferably via at least one ester link. It is more preferred if the quaternary ammonium material has two ester links present.

15 Preferably, the average chain length of the alkyl or alkenyl group is at least C₁₄, more preferably at least C₁₆. Most preferably at least half of the chains have a length of C₁₈.

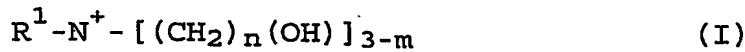
It is generally preferred if the alkyl or alkenyl chains are
20 predominantly linear.

The first group of cationic fabric softening compounds for use in the invention is represented by formula (I):

25 $[(CH_2)_n(TR)]_m$

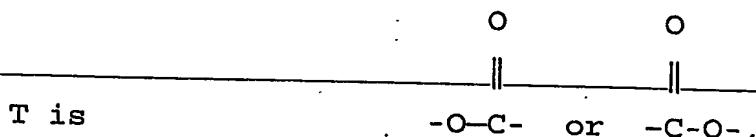
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x



wherein each R is independently selected from a C₅-35 alkyl or alkenyl group, R¹ represents a C₁-4 alkyl, C₂-4 alkenyl or a C₁-4 hydroxyalkyl group,

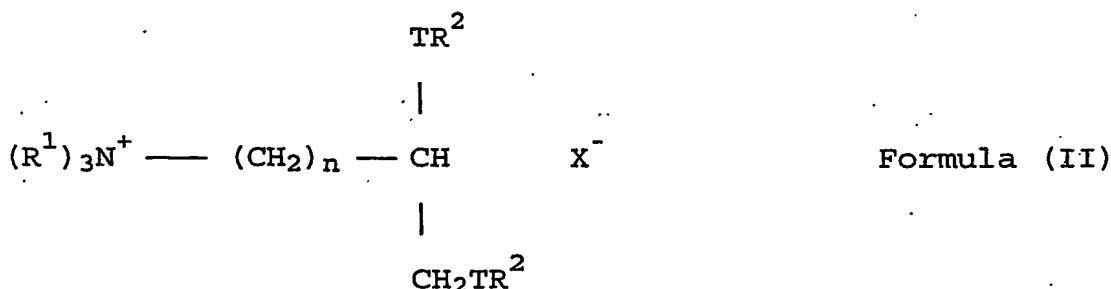
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- n is 0 or a number selected from 1 to 4, m is 1, 2 or 3 and 10 denotes the number of moieties to which it relates that pend directly from the N atom, and X⁻ is an anionic group, such as halides or alkyl sulphates, e.g. chloride, methyl sulphate or ethyl sulphate.
- 15 Especially preferred materials within this formula are di-alkenyl esters of triethanol ammonium methyl sulphate. Commercial examples include Tetranyl AHT-1 (di-hardened oleic ester of triethanol ammonium methyl sulphate 80% active), AT-1 (di-oleic ester of triethanol ammonium methyl sulphate 90% active), L5/90 (palm ester of triethanol ammonium methyl sulphate 90% active), all ex Kao. Other unsaturated quaternary ammonium materials include Rewoquat WE15 (C₁₀-C₂₀ and C₁₆-C₁₈ unsaturated fatty acid reaction products with triethanolamine dimethyl sulphate quaternised 25 90 % active), ex Witco Corporation.

The second group of cationic fabric softening compounds for use in the invention is represented by formula (II):

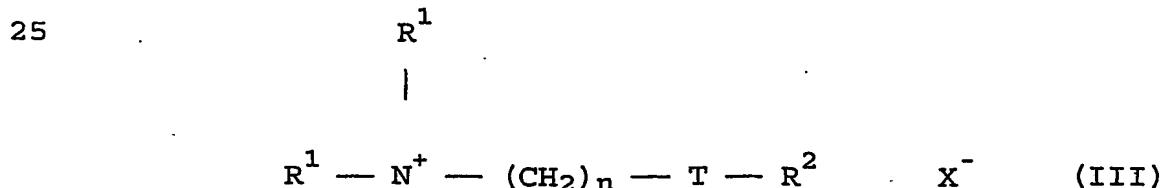
- 17 -

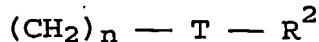


wherein each R^1 group is independently selected from C_{1-4} alkyl, hydroxyalkyl or C_{2-4} alkenyl groups; and wherein each R^2 group is independently selected from C_{8-28} alkyl or alkenyl groups; n is 0 or an integer from 1 to 5 and T and x^- are as defined above.

Preferred materials of this class such as 1,2 bis[tallowoyloxy]-3-trimethylammonium propane chloride and 1,2-bis[oleyloxy]-3-trimethylammonium propane chloride and their method of preparation are, for example, described in US 4137180 (Lever Brothers), the contents of which are incorporated herein. Preferably these materials also comprise small amounts of the corresponding monoester, as described in US 4137180.

A third group of cationic fabric softening compounds for use in the invention is represented by formula (III):

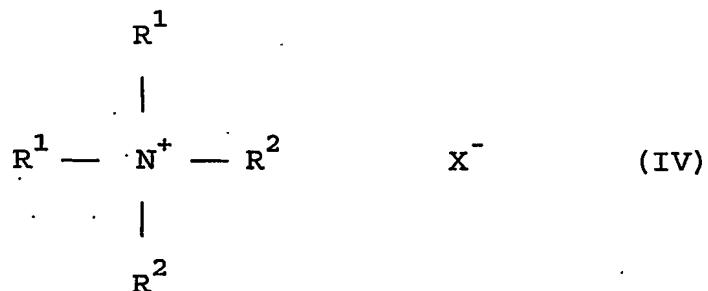




wherein each R^1 group is independently selected from C_{1-4}

5 alkyl, or C_{2-4} alkenyl groups; and wherein each R^2 group is
independently selected from C_{8-28} alkyl or alkenyl groups; n
 is 0 or an integer from 1 to 5 and T and X^- are as defined
 above.

10 A fourth group of cationic fabric softening compounds for
 use in the invention is represented by formula (IV) :



20

wherein each R^1 group is independently selected from C_{1-4}
 alkyl, or C_{2-4} alkenyl groups; and wherein each R^2 group is
independently selected from C_{8-28} alkyl or alkenyl groups;
 and X^- is as defined above.

25

The iodine value of the parent fatty acyl compound or acid
 from which the cationic softening material is formed is from

0 to 140, preferably from 0 to 100, more preferably from 0 to 60.

- It is especially preferred that the iodine value of the
5 parent compound is from 0 to 20, e.g. 0 to 4. Where the
iodine value is 4 or less, the softening material provides
excellent softening results and has improved resistance to
oxidation and associated odour problems upon storage.
- 10 When unsaturated hydrocarbyl chains are present, it is
preferred that the cis:trans weight ratio of the material is
50:50 or more, more preferably 60:40 or more, most
preferably 70:30 or more, e.g. 85:15 or more.
- 15 The iodine value of the parent fatty acid or acyl compound
is measured according to the method set out in respect of
parent fatty acids in WO-A1-01/46513.

The softening material is preferably present in an amount of
20 from 1 to 60% by weight of the total composition, more
preferably from 2 to 40%, most preferably from 3 to 30% by
weight.

The composition optionally comprises a silicone. Typical
25 silicones for use in the compositions of the present
invention are siloxanes which have the general formula
 $R_aSiO(4-a)/2$ wherein each R is the same or different and is
selected from hydrocarbon and hydroxyl groups, 'a' being
from 0 to 3. In the bulk material, 'a' typically has an
30 average value of from 1.85-2.2.

- 20 -

The silicone can have a linear or cyclic structure. It is particularly preferred that the silicone is cyclic as it is believed that cyclic silicones deliver excellent faster drying characteristics to fabrics.

5

Preferably, the silicone is a polydi-C₁-6alkyl siloxane.

Particularly preferred is polydimethyl siloxane. The siloxane is preferably end-terminated, if linear, either by
10 a tri-C₁-6 alkylsilyl group (e.g. trimethylsilyl) or a hydroxy-di-C₁-6 alkylsilyl group (e.g. hydroxy-dimethylsilyl) groups, or by both.

More preferably the silicone is a cyclic polydimethyl siloxane.
15

Suitable commercially available silicones include DC245 (polydimethylcyclopentasiloxane also known as D5), DC246 (polydimethylcyclohexasiloxane also known as D6), DC1184 (a
20 pre-emulsified polydimethylpentasiloxane also known as L5) and DC347 (a pre-emulsified 100cSt PDMS fluid) all ex Dow Corning.

The silicone may be received and incorporated into the
25 composition either directly as an oil or pre-emulsified.

Pre-emulsification is typically required when the silicone is of a more viscous nature.

Suitable emulsifiers include cationic emulsifiers, nonionic emulsifiers or mixtures thereof.

The reference to the viscosity of the silicone denotes
5 either the viscosity before emulsification when the silicone is provided as an emulsion for incorporation into the fabric conditioning composition or the viscosity of the silicone itself when provided as an oil for incorporation into the fabric conditioning composition.

10

The silicone preferably has a viscosity (as measured on a Brookfield RV4 viscometer at 25°C using spindle No.4 at 100 rpm) of from 1cSt to less than 10,000 centi-Stokes (cSt), preferably from 1cSt to 5,000cSt, more preferably from 2cSt
15 to 1,000cSt and most preferably 2cSt to 100cSt.

It has been found that drying time can be reduced using silicones having a viscosity of from 1 to 500,000 cSt.
However, it is most preferred that the viscosity is from 1
20 to less than 10,000cSt.

The silicone active ingredient is preferably present at a level of from 0.5 to 20%, more preferably from 1 to 12%, most preferably from 2 to 8% by weight, based on the total
25 weight of the composition.

Optionally and advantageously, one or more un-alkoxylated fatty alcohols are present in fabric conditioners of the present invention.

30

Preferred alcohols have a hydrocarbyl chain length of from 10 to 22 carbon atoms, more preferably 11 to 20 carbon atoms, most preferably 15 to 19 carbon atoms.

- 5 The fatty alcohol may be saturated or unsaturated, though saturated fatty alcohols are preferred as these have been ~~found-to-deliver-greater-benefits-in-terms-of-stability,~~ especially low temperature stability.
 - 10 Suitable commercially available fatty alcohols include tallow alcohol (available as Hydrenol S3, ex Sidobre Sinnova, and Laurex CS, ex Clariant).
 - 15 The fatty alcohol content in the compositions is from 0 to 10% by weight, more preferably from 0.005 to 5% by weight, most preferably from 0.01 to 3% by weight, based on the total weight of the composition.
 - 20 It is particularly preferred that a fatty alcohol is present if the composition is concentrated, that is if more than 8% by weight of the cationic softening agent is present in the composition.
 - 25 It is preferred that the compositions further comprise a nonionic surfactant. Typically these can be included for the purpose of stabilising the compositions.
- Suitable nonionic surfactants include addition products of ethylene oxide and/or propylene oxide with fatty alcohols, fatty acids and fatty amines.

Any of the alkoxylated materials of the particular type described hereinafter can be used as the nonionic surfactant.

- 5 Suitable surfactants are substantially water soluble surfactants of the general formula:



- 10 where R is selected from the group consisting of primary, secondary and branched chain alkyl and/or acyl hydrocarbyl groups; primary, secondary and branched chain alkenyl hydrocarbyl groups; and primary, secondary and branched chain alkenyl-substituted phenolic hydrocarbyl groups; the
15 hydrocarbyl groups having a chain length of from 8 to about 25, preferably 10 to 20, e.g. 14 to 18 carbon atoms.

In the general formula for the alkoxylated nonionic surfactant, Y is typically:

- 20 --O--, --C(O)O--, --C(O)N(R)-- or --C(O)N(R)R--

in which R has the meaning given above or can be hydrogen; and Z is preferably from 8 to 40, more preferably from 10 to
25 30, most preferably from 11 to 25, e.g. 12 to 22.

The level of alkoxylation, Z, denotes the average number of alkoxy groups per molecule.

- 30 Preferably the nonionic surfactant has an HLB of from about 7 to about 20, more preferably from 10 to 18, e.g. 12 to 16.

Examples of nonionic surfactants follow. In the examples, the integer defines the number of ethoxy (EO) groups in the molecule.

5 The deca-, undeca-, dodeca-, tetradeca-, and pentadecaethoxylates of n-hexadecanol, and n-octadecanol having an HLB within the range recited herein are useful viscosity/dispersibility modifiers in the context of this invention. Exemplary ethoxylated primary alcohols useful
10 herein as the viscosity/dispersibility modifiers of the compositions are C₁₈ EO(10); and C₁₈ EO(11). The ethoxylates of mixed natural or synthetic alcohols in the "tallow" chain length range are also useful herein. Specific examples of such materials include tallow alcohol-EO(11), tallow
15 alcohol-EO(18), and tallow alcohol-EO (25), coco alcohol-EO(10), coco alcohol-EO(15), coco alcohol-EO(20) and coco alcohol-EO(25).

20 The deca-, undeca-, dodeca-, tetradeca-, pentadeca-, octadeca-, and nonadeca-ethoxylates of 3-hexadecanol, 2-octadecanol, 4-eicosanol, and 5-eicosanol having an HLB within the range recited herein are useful viscosity and/or dispersibility modifiers in the context of this invention. Exemplary ethoxylated secondary alcohols useful herein as
25 the viscosity and/or dispersibility modifiers of the compositions are: C₁₆ EO(11); C₂₀ EO(11); and C₁₆ EO(14).

30 As in the case of the alcohol alkoxylates, the hexa- to octadeca-ethoxylates of alkylated phenols, particularly

monohydric alkylphenols, having an HLB within the range recited herein are useful as the viscosity and/or dispersibility modifiers of the instant compositions. The hexa- to octadeca-ethoxylates of p-tri-decylphenol, m-

5 pentadecylphenol, and the like, are useful herein.

Exemplary ethoxylated alkylphenols useful as the viscosity and/or dispersibility modifiers of the mixtures herein are: p-tridecylphenol EO(11) and p-pentadecylphenol EO(18).

10 As used herein and as generally recognized in the art, a phenylene group in the nonionic formula is the equivalent of an alkylene group containing from 2 to 4 carbon atoms. For present purposes, nonionics containing a phenylene group are considered to contain an equivalent number of carbon atoms
115 calculated as the sum of the carbon atoms in the alkyl group plus about 3.3 carbon atoms for each phenylene group.

The alkenyl alcohols, both primary and secondary, and alkenyl phenols corresponding to those disclosed immediately
20 hereinabove can be ethoxylated to an HLB within the range recited herein and used as the viscosity and/or dispersibility modifiers of the instant compositions.

Branched chain primary and secondary alcohols which are
25 available from the well-known "OXO" process can be ethoxylated and employed as the viscosity and/or dispersibility modifiers of compositions herein.

Suitable polyol based surfactants include sucrose esters
30 such sucrose monooleates, alkyl polyglucosides such as

stearyl monogluicosides and stearyl trigluicoside and alkyl polyglycerols.

The above nonionic surfactants are useful in the present
5 compositions alone or in combination, and the term
"nonionic surfactant" encompasses mixed nonionic surface
active agents.

The nonionic surfactant is present in an amount from 0.01 to
10 10%, more preferably 0.1 to 5%, most preferably 0.35 to
3.5%, e.g. 0.5 to 2% by weight, based on the total weight of
the composition.

The fabric conditioner compositions of the invention
15 preferably comprise one or more perfumes.

It is well known that perfume is provided as a mixture of
various components. Suitable components for use in the
perfume include those described in "Perfume and Flavor
20 Chemicals (Aroma Chemicals) by Steffen Arctander, published
by the author 1969 Montclair, N.J. (US), reprinted 1st April
1982 library of Congress Catalog Number 75-91398.

The perfume is preferably present in an amount from 0.01 to
25 10% by weight, more preferably 0.05 to 5% by weight, most
preferably 0.5 to 4.0% by weight, based on the total weight
of the composition.

The liquid carrier employed in the instant compositions is
30 at least partly water due to its low cost, relative
availability, safety, and environmental compatibility. The

level of water in the liquid carrier is more than about 50%, preferably more than about 80%, more preferably more than about 85%, by weight of the carrier. The level of liquid carrier is greater than about 50%, preferably greater than 5 about 65%, more preferably greater than about 70%. Mixtures of water and a low molecular weight, e.g. <100, organic solvent, e.g. a lower alcohol such as ethanol, propanol, isopropanol or butanol are useful as the carrier liquid.

10 Low molecular weight alcohols including monohydric, dihydric (glycol, etc.) trihydric (glycerol, etc.), and polyhydric (polyols) alcohols are also suitable carriers for use in the compositions of the present invention.

15 Co-active softeners for the cationic surfactant may also be incorporated in an amount from 0.01 to 20% by weight, more preferably 0.05 to 10%, based on the total weight of the composition. Preferred co-active softeners include fatty esters, and fatty N-oxides.

20 Preferred fatty esters include fatty monoesters, such as glycerol monostearate (hereinafter referred to as "GMS"). If GMS is present, then it is preferred that the level of GMS in the composition is from 0.01 to 10% by weight, based on the total weight of the composition.

25 The co-active softener may also comprise an oily sugar derivative. Suitable oily sugar derivatives, their methods of manufacture and their preferred amounts are described in WO-A1-01/46361 on page 5 line 16 to page 11 line 20, the disclosure of which is incorporated herein.

It is useful, though not essential, if the compositions comprise one or more polymeric viscosity control agents. Suitable polymeric viscosity control agents include nonionic and cationic polymers, such as hydrophobically modified cellulose ethers (e.g. Natrosol Plus; ex Hercules), cationically modified starches (e.g. Softgel BDA and Softgel BD, both ex Avebe). A particularly preferred viscosity control agent is a copolymer of methacrylate and cationic acrylamide available under the tradename Flosoft 200 (ex SNF Floerger).

Nonionic and/or cationic polymers are preferably present in an amount of 0.01 to 5wt%, more preferably 0.02 to 4wt%, based on the total weight of the composition.

C15

Other optional nonionic softeners, bactericides, soil-releases agents may also be incorporated in fabric conditioners of the invention.

The compositions may also contain one or more optional ingredients conventionally included in fabric conditioning compositions such as pH buffering agents, perfume carriers, fluorescers, colourants, hydrotropes, antifoaming agents, antiredeposition agents, polyelectrolytes, enzymes, optical brightening agents, pearlescers, anti-shrinking agents, anti-wrinkle agents, anti-spotting agents, antioxidants, sunscreens, anti-corrosion agents, drape imparting-agents, preservatives, anti-static agents, ironing aids and other dyes.

30

The product may be a liquid or solid. Preferably the product is a liquid which, in its undiluted state at ambient temperature, comprises an aqueous liquid, preferably an aqueous dispersion of the cationic softening material.

5

When the product is an aqueous liquid, it preferably has a pH of greater than 1.5 and less than 5, more preferably greater than 2 and less than 4.5.

- 10 The fabric conditioner composition is preferably used in the rinse cycle of a home textile laundering operation, where, it may be added directly in an undiluted state to a washing machine; e.g. through a dispenser drawer or, for a top-loading washing machine, directly into the drum.
- 15 Alternatively, it can be diluted prior to use. The compositions may also be used in a domestic hand-washing laundry operation.

EXAMPLESExample 1:

- 5 To determine the substantivity of a range of dyes the following experiment was performed. A stock solution of 1.5g/L of a base washing powder in water was created. The washing powder contained 18% NaLAS, 73% salts (silicate, sodium tri-polyphosphate, sulphate, carbonate), 3% minors
- 10 including perborate, fluorescer and enzymes, remainder impurities and water. The solution was divided into 60ml aliquots and dye added to this to give a solution of optical density of approximately 1 (5 cm pathlength) at the maximum absorption of the dye in the visible lengths, 400-700nm.
- 15 The optical density was measured using a UV-visible spectrometer. 1 piece of bleached, non-mercerised, non-fluorescent woven cotton cloth (ex Phoenic Calico) weighing 1.3g was placed in the solution at room temperature (20°C). This cloth represents a slightly yellow cotton. The cloth
- 20 was left to soak for 45 minutes then the solution agitated for 10 mins, rinsed and dried. Following this the optical density of the solution was re-measured and the amount of dye absorbed by the cloth calculated. This experiment was repeated for each dye and 4 replicates were done per dye.
- 25
- The dyes used and the % deposition is given in table 1.
- Table 2 gives the maximum-extinction coefficient, ϵ_{max} , in the wash solution and the peak absorption wavelength in solution and on cotton. All values are reported to 2
- 30 significant figures.

- 31 -

Table 1

<u>Dye</u>	<u>% Deposition</u>
Acid Black 1	23
Food Black 1	0.50
Direct Blue 1	48
Direct Violet 51	69
Direct Blue 71	34
Acid Violet 9	2.1
Acid Blue 80	6.8
Acid Violet 17	18
Acid Red 88	47
Acid Red 150	33

Table 2

5

<u>Dye</u>	<u>Type</u>	ϵ_{ax} [mol ⁻¹ L cm ⁻¹]	λ_{max} [nm] in solution, on cotton
Acid Black 1	Azo	51000	620, 630
Food Black 1	Azo	41000	570, 590
Direct Blue 1	Azo	120000	600, 640
Direct Violet 51	Azo	65000	550, 570
Direct Blue 71	Azo	120000	590, 600
Acid Violet 9	Triaryl	46000	540
Acid Blue 80	Anthraquinone	27000	630, 630
Acid Violet 17	Triaryl	53000	520, 590
Acid Red 88	Azo	14400	510, 520
Acid Red 150	Azo	23600	520, 530

Example 2

The experiment of example 1 was repeated except the dye level in the wash solution was decreased to 1/10th, so that 5 the optical density was 0.1 (5 cm path length). Following the washes the Ganz whiteness of the cloth was measured (see "assessment of Whiteness and Tint of Fluorescent Substrates with Good Interinstrument Correlation" Colour Research and Application 19, 1994). The results are displayed in table 10 3, the ganz whiteness values are accurate to +/-5 units. Large increase in the measured Ganz whiteness are found for the substantive blue and violet dyes with λ_{max} on cotton in the range 570:to 640.

15 Table 3

Dye	Ganz whiteness
control	150
Acid Black 1	171
Food Black 1	155
Direct Blue 1	190
Direct Violet 51	208
Direct Blue 71	205
Acid Violet 9	153
Acid Blue 80	152
Acid Violet 17	170

Acid black 1, direct blue 1, direct violet 51, direct blue 20 71 and acid violet 17 gave the greatest increase in Ganz whiteness.

Example 3

The clothes of experiment 2 were dried and then rewashed twice using the same method (drying in between washes). The
 5 build up of dye on the cloth was measured using a reflectometer and expressed as the K/S at the absorption maximum of the dye. K/S is the remission value and calculated using the Kubelka-Munk equation:

10
$$K/S = (1-R)^2/2R$$

K/S is proportional to the loading of the dye on the cloth and therefore provides a convenient measure of the dye build up. R is the reflectance at the maximum absorbance of the
 15 dye.

The results are shown in table 3.

20 Table 3

dye	% deposition in 1 st wash	K/S		
		Wash 1	Wash 3	Wash 5
control	-	0.0076	0.0083	0.0097
Acid Black 1	23	0.0421	0.0757	0.0835
Food Black 1	0.50	0.0141	0.0234	0.0265
Direct Blue 1	48	0.0552	0.1705	0.2737
Direct Violet 51	69	0.0609	0.1720	0.2706
Direct Blue 71	34	0.0544	0.1445	0.2079
Acid Violet 9	2.1	0.0093	0.0105	0.0115
Acid Blue 80	6.8	0.0073	0.0085	0.0095
Acid Violet 17	18	0.0180	0.0143	0.0162

The results show that dyes with substantivity below 30% show much lower/no build up over multiple washes and that dyes with substantivity below 7% are not effective at providing a benefit. Hence Dyes with substantivities between 7 and 30% 5 have the property of being substantive enough to deliver a benefit but not so substantitive as to build up over multiple treatments.

CLAIMS

1. A laundry treatment composition which comprises a photostable dye which is substantive to cotton, wherein during multiple treatments applied to a substantially white cotton fabric initially free of the dye, the treatments comprising applying the treatment composition to the cotton fabric in an aqueous environment and the fabric being subsequently dried, the loading of dye on the fabric does not increase in proportion to the number of washes.
2. A laundry treatment composition as claimed in claim 1, wherein after 10 treatments applied to a substantially white cotton fabric initially free of the dye, the loading of the dye in the fabric approaches a substantially constant value.
3. A laundry treatment composition as claimed in claim 1 or claim 2, wherein the ratio of the dye loading on white cotton after 5 washes to the dye loading after 1 wash is less than 4, preferably less than 3, more preferably less than 2, most preferably less than 1.5.
4. A composition as claimed in any preceding claim, which is a laundry detergent composition, preferably a particulate laundry detergent composition.
5. A composition as claimed in any preceding claim, which is a laundry fabric conditioner.

6. A composition as claimed in any preceding claim, which comprises surfactant.
7. A composition as claimed in claim 6, wherein the surfactant is a non-soap surfactant.
5
8. A composition as claimed in claim 6 or claim 7, wherein the surfactant is an anionic or cationic surfactant.

- 10 9. A composition as claimed in any one of claims 6 to 8, wherein the surfactant is C₈-C₁₅ linear alkyl benzene sulphonate.
10. A composition as claimed in any one of claims 6 to 9,
15 which comprises from 5 to 60 wt% of surfactant.
11. A composition as claimed in any preceding claim, which comprises fluorescer.
- 20 12. A composition as claimed in any preceding claim wherein the dye has a peak absorption wavelength of from 540nm to 650nm, preferably from 570nm to 630nm.
13. A composition as claimed in any preceding claim,
25 wherein the dye comprises a combination of dyes which together have the visual effect on the human eye as a single dye having a peak absorption wavelength of from 540nm to 650nm, preferably from 570nm to 630nm.
- 30 14. A composition as claimed in any preceding claim, wherein the dye has a substantivity to cotton in a

standard test of greater than 7%, preferably from 8 to 80%, more preferably from 10 to 60%, most preferably from 15 to 40%, wherein the standard test is with a dye concentration such that the solution has an optical density of approximately 1 (5 cm pathlength) at the maximum absorption of the dye in the visible wavelengths (400-700nm), a surfactant concentration of 0.3 g/L and under wash conditions of a liquor to cloth ratio of 45:1, temperature of 20°C, soak times of 45 minutes, agitation time of 10 minutes.

15. A composition as claimed in any preceding claim, which comprises from 0.0001 to 0.1 wt%, preferably from 0.0005 to 0.05 wt% of the dye, more preferably from 0.001 to 0.01 wt%, most preferably from 0.002 to 0.008 wt%.

16. A composition as claimed in any preceding claim, wherein the dye is an azo, anthraquinone or triarylmethane dye, preferably azo.

17. A composition as claimed in any preceding claim, wherein the dye is selected from the group of acid and direct dyes.

25
18. A composition as claimed in any preceding claim, wherein the dye is selected from acid black 1 and acid violet 17.

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